irregular boundary conditions" by J. W. Hopkins and D. Jackson, 245–259; "Groups possessing a small number of sets of conjugate operators" by G. A. Miller, 260–270.

ZEITSCHRIFT FÜR MATHEMATISCHEN UND NATURWISSENSCHAFTLICHEN UNTERRICHT, volume 50, no. 4–5, April, 1919: "Ein neues elementares Verfahren zur Lösung von Extremaufgaben" by H. Dörrie, 153–177; "Ueber die Konstruktion der Ellipse" by E. Wiedemann, 177–181; "Aufgaben-Repertorium," 189–192.

AMERICAN DOCTORAL DISSERTATION

J. H. Weaver, "Some extensions of the work of Pappus and Steiner on tangent circles." AMERICAN MATHEMATICAL MONTHLY, January, 1920, volume 27, pp. 2–11; also reprinted. (Pennsylvania, 1916.)

UNDERGRADUATE MATHEMATICS CLUBS.

EDITED BY U. G. MITCHELL, University of Kansas, Lawrence.

CLUB ACTIVITIES.

THE MATHEMATICS CLUB OF BROWN UNIVERSITY, Providence, R. I. [*1918*, 33–34, 459; *1919*, 167].

April 18, 1919: "The mathematical theory of investments" by Professor Clinton H. Currier.

May 15: "Mathematics in chemistry" by Esther A. Brintzenhoff '19; "Isosceles trigonometry" by Chauncey D. Wentworth '20; "History of calculating machines" by Mr. W. L. Morden, New England manager of the Monroe Calculating Machine Company. Election of officers. Taking of club photograph.

June 4: Picnic.

The average attendance at the meetings for the year 1918–19 was 47. The officers elected for the year 1919–20 were:

Chairman of Club, Professor Roland G. D. Richardson;

Committee on Program, Professor Raymond C. Archibald, Alice F. Hildreth Gr., Pauline A. Barrows '21, Chauncey D. Wentworth '20, Daniel E. Whitford '20;

Committee on Arrangements, Professor Ray E. Gilman, Frances M. Merriam '20, Constance W. Haley '21, Raymond L. Wilder '20, Marshall H. Cannell '22, Bruce H. McCurdy '22.

THE MATHEMATICS CLUB OF CONNECTICUT COLLEGE, New London, Conn. [*1918*, 270, 460].

Active membership in this club is limited to students pursuing courses in mathematics beyond the regular freshman requirement. There were ten members of the club in 1918–19 and due to influenza and diphtheria quarantines as well as to war conditions only four formal meetings were held.

The officers for 1918–19 were: President, Margaret Maher '19; secretary, Justine McGowan '20; treasurer, Louise Avery '21. These officers constitute

the committee on program and arrangements. At the meeting of May 16, 1919, Justine McGowan '20 was elected president for the year 1919–20.

Programs for the four meetings are given below.

November 23, 1918: "Arithmetic in the educational program of earlier days" by Professor David D. Leib.

February 4, 1919: "Flatland" by Dorothea E. Peck '19.

April 15: "Calculating machines" by Marie Munger '20.

May 16: "Mathematical puzzles and paper cutting" by Dorothy Pryde '21.

MATHEMATICS CLUB OF IOWA STATE UNIVERSITY, Iowa City.

This club was organized and held its first meeting April 3, 1919. During the year 1918–19 it was not primarily an undergraduate club since its officers were all graduate students or members of the faculty and students had no part in the programs presented. However, junior and senior students were asked to attend the meetings, were allowed to vote and an effort was made to keep the matter presented within the range of their mathematical advancement. It is intended that undergraduate students shall take part in the programs to be given in 1919–20.

The officers for the remainder of the year 1918–19 were: President, E. M. Berry Gr.; secretary-treasurer, Helen J. Williams Gr.; program committee, E. M. Berry Gr., Professor Richard P. Baker and Professor Edward W. Chittenden.

The programs for the remainder of the year 1918–19 are given below.

April 3, 1919: "On functional relations for which the correlation coefficient is zero" by Professor Henry L. Rietz.

April 17: "Graphical solutions for the imaginary roots of an algebraic equation" by Rutherford E. Gleason, Instructor in Mathematics.

May 1: "Computing the mean and standard deviations of a frequency distribution" by Professor John F. Reilly.

May 15: "Some applications of differential equations" by Professor Raymond B. McClenon, Grinnell College, Grinnell, Iowa.

May 28: "Some properties of cubic curves" by Frank M. Weida, Instructor in Mathematics.

MATHEMATICS CLUB OF IOWA STATE TEACHERS COLLEGE, Cedar Falls
[*1918*, 311–312, 459].

The officers for the summer term 1918 were: President, Professor Peter Luteyn; secretary, Lorena F. French '18; executive committee, Professor Ira S. Condit, Professor Charles W. Wester and Margery Kinne '21.

The officers for the fall, winter and spring terms were: President, Professor Emma F. Lambert; secretary, Mary A. Peters '19; executive committee, Professor Charles W. Wester, Professor Robert D. Daugherty and Garnet Maulsby '20. The executive committee prepares the programs and decides on the dates of meetings.

Programs between May, 1918, and May, 1919, were as follows:

May 8, 1918: "Group recitations in geometry" by Phoebe Cowan '18; "Teaching of algebra in secondary schools" by Garnet Maulsby '20; "The number concept" by Verna Zarr '18.

May 29: "The correlation of mathematics in secondary schools" by Lorena F. French '18; "Calculus applied to physics" by Laura Huber '19.

June 27: "Tests of efficiency in teaching" by Mr. Charles W. Kline, superintendent of schools, East Waterloo, Iowa.

July 10: "Supervised study in secondary schools" by Miss Jessie Cunning, Instructor in Mathematics, Ft. Dodge High School, Ft. Dodge, Iowa; "The equation as an interpretation of the problem" by Principal W. E. Beck, Iowa City High School.

July 31: "Important points to be emphasized in the teaching of algebra" by Principal W. E. Beck, Iowa City High School.

August 14: "Standard forms in teaching arithmetic" by Miss Olive Tilton, Supervisor of Mathematics, Iowa State Teachers College Training School.

November 20: "An introduction to modern geometry" by Professor Wester; "Pascal's theorem" by Eleanor Sweeney '19; "Brianchon's theorem" by Garnet Maulsby '20; "Harmonic sets" by Dora Hospers '20; "Poles and Polars and applications to metrical relations" by Mary A. Peters '19.

January 29, 1919: "Rhythm in number land" by Professor Daugherty.

February 19: "The development of number" by Garnet Maulsby '20.

March 19: "Chicago meeting of the Department of Superintendence, N. E. A." by Professor Condit; "The fourth dimension" by Eleanor Sweeney '19.

April 16: "The metric system" by Professor Lambert.

April 30: "Fractions" by Professor Wester; "Irrational number" by Bernice Wilcox '19.

MATHEMATICS CLUB OF MOUNT HOLYOKE COLLEGE, South Hadley, Mass.
[*1918*, 312–313, 458].

October 19, 1918: Social meeting.

November 16: "The abacus and other forms of counting machines" by Dorothy C. Smith '19.

January 18, 1919: "Fundamental principles of flight" (illustrated with models of monoplanes) by Elizabeth R. Laird, Professor of Physics.

February 15: "History and applications of logarithms and the slide rule" by Thelma Bridge '20, Margaret F. Wilcox '19 and Mildred Allen, Instructor in Physics.

MATHEMATICS CLUB OF THE UNIVERSITY OF WASHINGTON, Seattle [*1919*, 170].

An account of this club was published in the April, 1919, number of the MONTHLY. The supplementary items of information given below are found in the MONTHLY for December, 1905.

The club was organized in the autumn of 1905. The first officers were: President, Professor Robert E. Moritz; secretary, Professor Frank M. Morrison. The monthly meetings of the club were devoted to reviews, current mathematical literature and reports on original work.

PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL AND OTTO DUNKEL.

Send all communications about problems and solutions to B. F. FINKEL, Springfield, Missouri.

PROBLEMS FOR SOLUTION.

2799. Proposed by H. C. BRADLEY, Massachusetts Institute of Technology.

A newspaper recently gave this problem: Cut a regular six-pointed star into the fewest number of pieces which will fit together and make a square. The newspaper gave a solution in seven pieces. First cut off two opposite points of the star. Divide each into two parts, and fit to the remaining portion of the star so as to make a rectangle. Find the mean proportional between the length and breadth of this rectangle (construction not shown); this is the side of the required square. Using this dimension on the two long sides of the rectangle, divide the latter into three pieces, which make the square. Total seven pieces.

How may the square be formed with not more than five pieces?

2800. Proposed by A. M. HARDING, University of Arkansas.

If $x + y + z = xyz$, show that

$$\frac{2x}{1 - x^2} + \frac{2y}{1 - y^2} + \frac{2z}{1 - z^2} = \frac{2x}{1 - x^2} \cdot \frac{2y}{1 - y^2} \cdot \frac{2z}{1 - z^2}.$$

2801. Proposed by A. S. HATHAWAY, Rose Polytechnic Institute.

A dog at the center of a circular pond makes straight for a duck which is swimming along the edge of the pond. If the rate of swimming of the dog is to the rate of swimming of the duck as $n : 1$, determine the equation of the curve of pursuit and the distance the dog swims to catch the duck.

2802. Proposed by WARREN WEAVER, Throop College of Technology.

Consider two circles, each of radius k, with centers at $(0, 0)$ and $(k', 0)$ respectively, where k' is less than k. Through the point $(k', 0)$ draw a ray making an angle θ with the positive x-axis. Call the intersection of this line with the first circle A, and with the second circle B. Extend the line through the point $(k', 0)$ in the opposite direction, and call the intersection of this extension with the first circle A', and with the second circle B'. Prove that the sum of the two segments AB and $A'B'$ is independent of k, and depends only upon k', i. e. the shift of the circles, and θ.

2803. Proposed by S. A. COREY, Des Moines, Iowa.

In the November, 1918, number of the *Proceedings of the Edinburgh Mathematical Society* (Vol. 36, part 2, page 103), Professor Whittaker gives the following formula for the solution of algebraic and transcendental equations:

The root of the equation

$$0 = a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4 + \cdots,$$